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Endoscopic Incision of Short (<3 cm) Urethral Strictures After Phallic Reconstruction

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Abstract

Introduction: Urethral stricture formation is a frequent complication after phallic reconstruction, but little is known about the treatment. Endoscopic cold-knife incision has long been applied for short urethral strictures. Can this treatment be used for strictures in the phalloplasty patients as well?

Materials and Methods: Thirty-two endoscopic urethrotomies were done in 22 patients with a phalloplasty. Only noncomplicated strictures shorter than 3 cm were considered appropriate for endoscopic incision. The stricture was treated by a cold-knife incision. The urethral catheter was maintained for at least 2 weeks. Follow-up was done every 3 months during the first year and annually thereafter. Comparing failures with successful cases, prognostic factors for success are assessed.

Results: Median follow-up is 51 months (range, 8–95 months). In 14 patients, no previous intervention was done. Mean stricture length is 1 cm (range, 0.5–2.5 cm). Endoscopic incision was successful in 14/32 cases (43.8%). First incision was successful in 10/22 cases (45.5%), a second incision was successful in 4/7 cases (57.1%), but three or more incisions were never successful (0/3). The only significant difference between failures and successful cases is the interval between phalloplasty and endoscopic incision (32 vs. 9.9 months; $p = 0.00008$).

Conclusions: Endoscopic incision for short (<3 cm) urethral strictures after phallic reconstruction can solve the problem in about half of the cases. Three or more incisions seem to be useless. Endoscopic incision is significantly better when performed with a long-term interval after phalloplasty, indicating that a well-healed phallic urethra is more prone to a successful endoscopic incision.

Introduction

Phallic reconstruction with phalloplasty is nowadays the gold-standard treatment for female-to-male transsexuals.[1] With a large experience obtained in these sex-dysphoric patients, phalloplasty can also be a valuable technique in the treatment of patients with severe penile insufficiency of different origins.[2] One of the goals of phallic reconstruction is normal voiding in a standing position, and for this reason, the reconstructed phallus must contain a urethra to allow this. Unfortunately, urethral stricture formation and fistulae are frequent complications after phalloplasty.[1,3,4] The stricture is mainly observed at the junction of the perineal urethra with the phallic urethra. This is a typical mucocutaneous junction that is prone to stricture formation. Standard guidelines or recommendations for the treatment of these strictures are lacking.

Endoscopic treatment with cold-knife incision as described by Sachse[5] has long been used in the treatment of urethral strictures and is considered a first-line therapy for short urethral strictures in the nonreconstructed normal urethra.[6] Can this treatment also be used for short strictures in phalloplasty patients?

Materials and Methods

The sex team of the Ghent University Hospital is a team of expertise in phallic reconstruction with over more than 350 phalloplasties in female-to-male transsexuals and 11 phalloplasties for males with severe penile insufficiency. Our technique of first choice is the radial forearm free flap (more than 300 patients), with the anterolateral thigh flap as alternative (about 50 patients). Both techniques are always done by the same surgical team (P.H., S.M., and N.L.) and are highly standardized. Starting in September 2000, a prospective database is collected of all phalloplasties and its complications. Using this database, 22 patients who underwent endoscopic incision were identified out of a group of 51 patients with a stricture. In these 22 patients, 32 endoscopic incisions were done: 15 patients underwent a single procedure, 6 patients

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underwent a second procedure (respectively, after 5, 17, 20, 35, 39, and 57 months), and 1 patient underwent repetitive[5] procedures. The other 29 patients with a stricture who did not underwent endoscopic incision were treated by open urethroplasty because of a long and/or a complex stricture. Indeed, only uncomplicated and short (<3 cm) strictures were considered for endoscopic incision. In case of a longer stricture and/or a complex stricture (e.g., multioperated, multiple locations, and concomitant fistula), an open urethroplasty was performed. Except for one patient who lost his penis after a traffic accident, all phalloplasties were done in female-to-male transsexual patients. The phallic reconstruction was done by a radial forearm free flap in 20 patients and by an anterolateral thigh flap in 2 patients. During phallic reconstruction, the urethra is made from skin and is reconstructed using a tube-in-a-tube principle. In the male patient, this reconstructed urethra was anastomosed to the remaining urethral stump. In female-to-male transsexuals, the female urethra is lengthened using tubularization of the urethral plate at the inner surface of the labia minora till the tip of the clitoris. The clitoris with the new urethral orifice is released from the vulvar position and is brought to the prepubic area using a subcutaneous tunnel. At this site the lengthened female urethra is anastomosed with the reconstructed skin urethra of the phallus. For this anastomosis, both urethral ends are largely spatulated and connected end-to-end with 16 sutures Vicryl™ 4.0 (Ethicon, Somerville, NJ). Our surgical technique has been extensively described in former publications.[1,2] Before operation, the length and location of the stricture was evaluated by retrograde urethrography combined with voiding cysto-urethrography. If undecided after this, a urethroscopy was done. A preoperative urine culture is done, and if positive, antibiotics are started. The operation is done without anesthesia if the phallus was not sensitive yet. If not, spinal or general anesthesia is used. The use of abundant lubrificant (Endogel™; Farco-Pharma GmbH, Köln, Germany) is advocated to avoid further trauma to the urethra, since the reconstructed skin urethra is less elastic. During operation the stricture is treated by a cold-knife incision at the 4, 8, and 12 o'clock position until the urethra allows easy passage of the 18F cystoscope. The technique is the same as applied for normal urethral strictures. The patient is discharged the same day or the day after. The urethral catheter, however, is maintained for at least 2 weeks. The patients were followed with history-taking, uroflowmetry, and postvoid residual urine measurement every 3 months during the first year and

Table 1. Patient Characteristics and Outcomes

Patient	*Age (years)*	*Type*	*Follow-up (months)*	*Previous interventions*	*Interval time (months)*	*Location*	*Stricture length (cm)*	*Failure*
1	44	RFFF	72	None	55	Anastomosis	1	No
2	52	RFFF	12	Urethroplasty	50	Anastomosis	1	No
3	33	RFFF	92	None	1	Anastomosis	1	Yes, after 2 months
	36		57		36		1	No
4	34	RFFF	8	None	2	Anastomosis	1.5	No
5	20	RFFF	57	None	8	Anastomosis	1.5	Yes, after 54 months
6	29	RFFF	27	None	3	Anastomosis	2.5	Yes, after 1 month
7	35	ALT	21	None	3	Anastomosis	1	No
8	45	RFFF	22	Urethroplasty	37	Anastomosis	0.5	No
9	39	RFFF	16	Urethroplasty	7	Anastomosis	1	No
10	34	RFFF	21	Urethroplasty	22	Anastomosis	1	No
11	32	RFFF	46	None	2	Anastomosis	1	Yes, after 13 months
	34		29		19		1	Yes, after 9 months
12	41	RFFF	51	None	9	Phallic urethra	1	No
13	34	RFFF	48	None	2	Anastomosis	1	Yes, after 4 months
	37		9		43		1	No
14	33	RFFF	47	None	3	Anastomosis	1	Yes, after 2 months
15	40	RFFF	62	None	90	Anastomosis	0.5	No
16	42	ALT	38	Urethroplasty	14	Phallic urethra	1	Yes, after 2 months
17	26	RFFF	48	Urethroplasty	12	Anastomosis	2	Yes, after 3 months
18	35	RFFF	51	Urethroplasty	11	Anastomosis	1	No
19	25	RFFF	95	None	3	Anastomosis	1	Yes, after 3 months
	25		92		6		1	Yes, after 9 months
	26		81		15		1	Yes, after 1 month
	27		79		19		1	Yes, after 5 months
	29		50		48		1	Yes, after 31 months
20	28	RFFF	92	None	3	Anastomosis	1	Yes, after 5 months
	30		72		22		0.5	No
21	30	RFFF	72	Urethroplasty	4	Phallic urethra	1	Yes, after 3 months
	35		15		61		1	No
22	25	RFFF	73	None	5	Anastomosis	1	Yes, after 2 months
	25		68		11		1	Yes, after 3 months
Mean ± SD	33 ± 7		51 ± 27		20 ± 22		1.1 ± 0.4	56.2%

RFFF = radial forearm free flap; ALT = anterolateral thigh flap; SD = standard deviation.

annually thereafter. In case of suspicion of recurrence (clinically or on uroflowmetry: maximum urinary flow rate <15 mL/s) a retrograde urethrography was done, and if inconclusive, urethroscopy. Although retrograde urethrography and urethroscopy are more sensitive in the detection of recurrence, it was not routinely used because of the more invasive character of these procedures and the reluctance of our patients to undergo these procedures routinely. Failure is defined as the need for any additional instrumentation (including dilation) or operation. The failures were compared with successful cases to search for prognostic factors. Patients' age, stricture length, previous interventions and interval time between phalloplasty, and endoscopic incision were evaluated. Stricture location (anastomosis site vs. phallic urethra) was excluded from statistical analysis because of the major imbalance between the two groups (19 vs. 3 patients; see Table 1). Statistical analysis was done with the Fishers' exact mid *P*-test. A p-value <0.05 is considered statistically significant.

Results

Median follow-up is 51 months (range, 8–95 months) (Table 1). Mean patient age is 33 years (range, 20–52 years). In 14/22 patients, no previous intervention was done to solve the urethral stricture. In the other eight patients, an open urethroplasty was already tried to solve the stricture. Mean stricture length is 1 cm (range, 0.5–2.5 cm). The stricture was located at the anastomosis of the perineal and the phallic urethra in 19 patients and at the phallic urethra in 3 patients. Endoscopic incision was successful in 14/32 cases (43.8%). First incision was successful in 10/22 cases (45.5%), a second incision was successful in 4/7 cases (57.1%), but three or more incisions were never successful (0/3). Comparing the failures with the successful cases (Table 2), there were no significant differences in follow-up, patients' age, stricture length, and previous interventions. The situation is different when looking at the time interval between phalloplasty and endoscopic incision. Mean time interval between phalloplasty and endoscopic incision is 20 months (range, 1–90 months). In the successfully treated patients, mean interval between phalloplasty and endoscopic incision is 32 months, whereas in the failure group this mean interval time is only 9.9 months. This difference in interval time is highly significant ($p = 0.00008$).

Table 2. Comparison of Failures with Successful Cases

	Failures (n = *18*) *mean ± SD*	*Successes* (n = *14*) *mean ± SD*	p-*Value*
Patients' age (years)	29 ± 5	38.3 ± 5.7	0.14; NS
Stricture length (cm)	1.17 ± 0.42	0.93 ± 0.27	0.47; NS
Previous interventions (*n*)	9	5	0.34; NS
Interval time between phalloplasty and endoscopic incision (months)	9.9 ± 11.2	32 ± 26	0.00008*

NS = not significant.
*p<0.05.

Discussion

Since long, cold-knife endoscopic incision has been used in the treatment of urethral strictures. Initial reports[7,8] showed high success rates (as high as 76%), but later series with longer follow-up[9–12] showed somewhat more modest results (overall success rate, 30%–60%). The ideal indication is a primary, single, short stricture.[6,10] Although endoscopic incision of the stricture with a Holmium laser could be a valuable alternative technique, it was not performed on these patients because it is not available at our department.

Urethral strictures after phallic reconstruction are frequent (42%–58%).[1,3,4] Mostly, these strictures are short and located at the anastomosis between the mucosal perineal urethra and the skin phallic urethra. Presumably, these strictures form as a result of relative ischemia at the anastomosis of tissues of the native urethra to the reconstructed skin urethra, which is exacerbated by kinking at the neophallus base.[3] Other possibilities of stricture formation are surgical errors or vascular complications.[13] Further, any mucocutaneous connection is prone to stricture formation. Our results suggest that these strictures can be successfully treated by endoscopic incision in about half of the cases. These results are in the range with those obtained for normal urethral strictures. To our knowledge, this is the first report of endoscopic incision of strictures after phalloplasty, so a comparison with other series is not possible. Since former studies[9,12] showed disappointing results for long (>3 cm) urethral strictures, endoscopic incision of longer strictures after phallic reconstruction was not performed. We believe that endoscopic incision is useless in these cases, and these patients are better treated by open urethroplasty. The same applies to complex or complicated strictures. As in normal urethral strictures,[9,10,14] a second incision can still obtain some success, but three or more incisions are useless. These recurrent cases should be treated by open urethroplasty as well. Unfortunately, reports about open urethroplasty for strictures after phalloplasty are scarce.[3,4,13]

After endoscopic incision of a normal urethral stricture, the transurethral catheter, if needed, is normally removed after a few days. The exact duration and whether this has an impact on the success rate have always been a matter of debate.[6,12,15] We believe that after incision of strictures after phallic reconstruction, the catheter must be maintained for at least 2 weeks. The incision is made in skin urethra and not in mucosa, surrounded by spongious tissue. It is our assumption that this skin needs a longer time to reepithelialize and to heal than urethral mucosa. Nevertheless, we are aware that we do not have comparative data to support this statement and that further research about catheter time is needed.

Comparing successful cases with failures, the only significant difference between the two groups was the time interval between phalloplasty and endoscopic incision. This finding suggests that a stricture that occurs in an otherwise well-healed skin urethra is more prone to a successful incision than an incision at a stricture shortly after phalloplasty. Indeed shortly after phalloplasty, which is in fact a free flap or pediculated flap transfer, the skin of the neourethra and the eventual stricture is still in an inflammatory phase and is often hypovascular. It seems logical that an incision in this inflammatory tissue will be less successful. Probably, it is better to

postpone an endoscopic incision until the phallus has well been healed. In the mean time, the stricture can be treated by either perineostomy or a suprapubic catheter. This theory, however, is purely hypothetical. A prospective randomized trial comparing a group of patients undergoing an early urethrotomy with a group of patients undergoing first perineostomy or suprapubic cystostomy and a delayed (>1 year) urethrotomy thereafter is necessary to prove this theory. Unfortunately, this will be extremely difficult to do so. This paper is also unable to answer the question which technique (endoscopic urethrotomy or urethroplasty) is the best for the treatment of these short strictures. Again, a prospective randomized trial is necessary to solve this therapeutic problem. We are aware of the other shortcomings of this paper, and that conclusions are drawn on rather small numbers of patients, but at the time being this is the only information available on this type of minimally invasive endoscopic surgery in these new and challenging patients.

Conclusions

Endoscopic incision is a minimally invasive treatment for short urethral strictures after phallic reconstruction that can solve the problem in about half of the cases. Three or more incisions seem to be useless. This is comparable with the results published for endoscopic incision in normal urethral strictures. Endoscopic incision is significantly better when performed with a long-term interval after phalloplasty, indicating that a well-healed phallic urethra is more prone to a successful endoscopic incision.

Disclosure Statement

The authors declare that they have no conflicts of interest.

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Abbreviations Used

ALT = anterolateral thigh flap
NS = not significant
RFFF = radial forearm free flap
SD = standard deviation